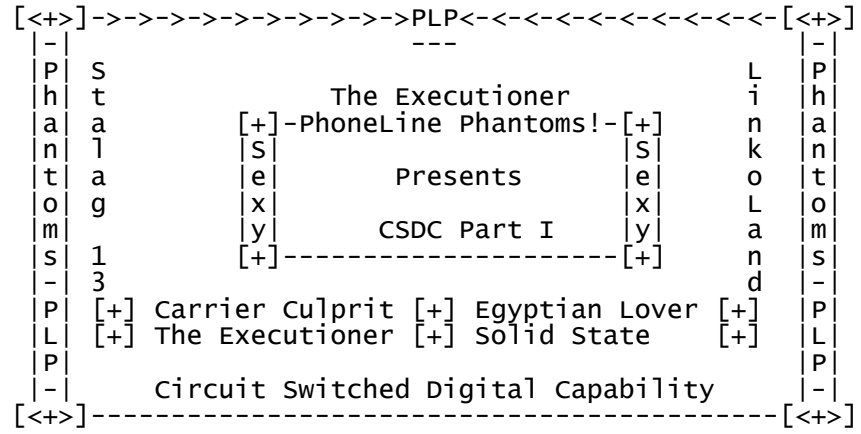

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=Part I=
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The Circuit Switch Digital Capability (CSDC) allows for the end to end digital transmission of 56 kilobits per second (kb/s) data and, alternately, the transmission of analog voice signals on a circuit switched basis.

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=Network Perspective=
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The CSDC feature was formerly known as PSDC (Public Switched Digital Capability). These two terms can be used synonymously. The CSDC feature provides an alternate voice/data capability. If a SLC Carrier System 96 is used, digital signals ar
e transmitted by T1 signal. If the loop is a two wire loop, the CSDC feature utilizes time compression multi-plexing (TCM) which allows for the transmission of digital signals over a common path using a separate time interval for each direc
tion. During a CSDC call an end user may alternate between the voice and data modes as many times as desired. The CSDC feature can support subvariable data rates from customer premises equipment, but a 56 kb/s rate is utilized in the networ
k. Some possible applications of the CSDC feature are:

1. Audiographic Teleconferencing.
2. Secure Voice.
3. Facsimile.
4. Bulk Data.
5. Slow scan television.

The ESS switch provides end user access and performs signalling, switching, and trunking functions between the serving ESS switch and other CSDC offices. End users of CSDC require a network channel terminating equipment circuit (NCTE) which
 is the SD-3C476 or its equivalent. End user access is over 2-wire metallic loops terminating at the metallic facility terminal (MFT) or SLC Carrier System. End users not served directly by a direct CSDC ESS office, can access CSDC equipmen
t through a RX (Remote Exchange) access arrangement via use of a D4 Carrier System and if required, a SLC Carrier System. The T-Carrier trunks serve for short haul transmissions while long haul transmissions are served by digital microwave
radio and other digital systems.

If the NCTE interface is used with customer premises equipment, a miniature 8-position series jack is used to connect the NCTE to other equipment. The jack pins are paired off; data transmit pair, data recieve pair, a voice pair, and a mode

switch pair. The data pairs support the simultaneous transmission and reception of digital data in a bipolar format at 56 kb/s. The data pairs also provide for the xmission of control information to and from the network. The voice pairs su pports analog signal transmission and provies for call setup, disconnect and ringing functions. The mode control pair provides signals to the network when a change in mode (voice to data/data to voice) is requested by the customer.

A CSDC call is originated over a 2-wire loop which can also be used for Message Telecommunication Service (MTS) calls. Lines may be marked (MTS/CSDC or CSDC only). Touch tone is needed to originate a CSDC call. Originations may be initiated
manually or with Automatic Calling Equipment (ACE) if available. Digit reception, transmission and signalling follow the same procedures used for a MTS outgoing call on CCIS or non-CCIS trunks. However CSDC calls are ALWAYS routed over dig
ital transmission facilities.

The long term plan also allows for EA-MF (Equal Access-Multi Frequency) signalling and improved automatic message accounting (AMA) records. A CSDC call is screened to ensure that the originating party has CSDC service and that the carrier t
o be used provides 56 kb/s voice/data capability. A blocked call is routed to a special service error announcement. Non-CSDC calls are not allowed to route over CSDC-only carriers. Nonpayer screening is not allowed for CSDC calls using CCIS
signalling.

A CSDC call is routed directed to the carrier or indirectly via the Access Tandem (AT) or Signal Conversion Point (SCP). The call is terminated directly from the carrier to the end office or indirectly via the AT or SCP. Signalling for dire
ct routing is either CCIS or EA-MF and is assigned on a trunk group basis.

The AT is an ESS switch which allows access to carriers from an end office without requiring direct trunks. Signalling between end offices and the AT is either EA-MF or CCIS. Trunks groups using EA-MF signalling can have combined carrier tr
affic. Separate trunk groups for each carrier are required for CCIS signalling.

The SCP is an ESS switch which allows access to carriers using only CCIS signalling from offices without the CCIS capability. Separate trunk groups for each carrier are used between the originating end office and the SCP. Separate trunk gro
ups are optional between the SCP and the terminating end office and the terminating end office. Signalling between the end office and the SCP is MF. The SCP must have direct connection to the carrier using CCIS signalling.

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=Remote Switching System=
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The RSS can be used as a remote access point for CSDC. The compatibility of RSS and CSDC improves the marketability of both features. The RSS design allows a provision for the support of D4 special service channel bank plug-ins. This provis
ion allows for such applications as off premises extensions, foreign exchanges lines, and private lines. Thus the RSS can be used as a CSDC access point in a configuration similiar to the CSDC RX arrangement.

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=Centrex/ESSX-1=
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The CSDC feature is optionally available to Centrex/ESSX-1 customers. Most of the capabilities of centrex service can be applied to centrex lines that have been assigned the CSDC feature. In voice mode, the centrex/CSDC line can exercise an
y of the centrex group features that have been assigned to the line. In the voice/data mode, several centrex features are inoperable or operate only on certain calls. The CSDC feature can be provided for a centrex group as follows:

1. Message Network Basis (MTS)
2. Intracentrex group basis
3. Intercentrex group basis
4. Any combination of the above

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=User Perspective for the CSDC=
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To establish a CSDC call, a CSDC user goes off hook, recieves dial tone and dials. The dialing format for the CSDC/MTS is as follows for interim plan:

#99 AB (1+) 7 or 10 digits (#)

The customer dials '#99' to access the CSDC feature. The 'AB' digits are the carrier designation code. No dial tone is returned after the 'AB' digits. The 1+ prior to the 7 or 10 digit directory number must be used if it is required for MTS
calls. The '#' at the end is optional, if it is not dialed, end of dialing is signalled by a time-out.

The long term dialing format for the CSDC/MTS is as follows:

#56 (10XXX) (1+) 7 or 10 digits (#)

Dialing '#56' indicates 56kb/s alternate voice/data transmission. the '10XXX' identifies the carrier to be used for the call. If '10XXX' is not dialed on an inter-LATA call, the primary carrier of the sibscriber is used. If '10XXX' is not d
ialed on an intra-LATA call, the telco handles the call. The long term plan also allows for several abbreviated forms. Dialing '#56 10XXX #' is allowed for routing a call which prompts the customer to dial according to the carrier dialing p
lan. Dialing '#56 10XXX' followed by a speed call is also allowed. If a customer has pre-subscribed to a carrier which can carry CSDC calls and the CSDC access code is stored as part of the speed calling number, the customer dials the speed
calling code to make a CSDC call.

Regular ringing is applied to the called line and audible ringing is applied to the calling terminal. Once the voice connection is established, either party can intiate the switch to data mode, if desired. To initiae a change in mode a CSSD
C user must initiate a mode switch command via a closure of the NCTE mode control leads.

An example of a mode switch:

Suppose party A wants to switch to data. Party A issues a mode switch command and recieves a signal called far end voice (FEV) which is a bipolar sequence (2031 hz at 60 ipm). Party A may now ha ngup the handset at any time after initia
ting the mode switch command. Party B recieves a far end data (FED) tone (2031 Hz at 39 ipm) indicating party A wants to switch to data. If party B agrees to switch to data, party B must initiate a mode switch command. Party B may nor hangu
p the handset. Data transmission is now possible.
To switch to the voice mode, anyone can initiate it. To switch, party A would pick up the handset and initiate a mode switch command and will recieve the FED tone. Party B
recieves the FEV tone indicating that party A wants to go voice. Party B must now pick up the hand set and initiate a mode switch command. To terminate a call, either party may just leave the handset on and indicate a mode switch. If termin
ation is issued during a mode conflict, time out will disconnect the call, usually about 10 or 11 seconds.

Centrex/ESSX-1 customers may utilize the CSDC service in several ways if they have CSDC terminals with the necessary on premises equipment. The standard CSDC call is initiated by dialing the message network access code, (9). The dialing seq
uence is then identical to the plan for MTS:

#99 AB (1+) 7 or 10 digits (interim plan)

#56 (10XXX) (1+) 7 or 10 digits (#) (long term plan)

The dialing pattern to establish intercentrex or intracentrex CSDC calls is as follows:

CSDC access code + extension

An intracentrex/CSDC call is initiated by dialing the trunk access code assigned to route a loop-around centrex/CSDC trunk group. Next, the extension of the desired station is dialed. To establish an intercentrex call a different trunk acce
ss code must be used to route the CSDC calls to another centrex group instead of a station.

The CSDC maintenance circuit has a dialable digital loopback. This loopback is very useful in CSDC testing. A customer can check their access line by dialing the test DN. The loop is automatically activated when the call is answered.

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=End of Part I.=
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Part II: The CSDC hardware, and office data structures.

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=(C) 1986 The Executioner and The PhoneLine Phantoms!=
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=Thanks to AT&T for their information and cooperation=
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